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A capital theory approach should guide national sustainability policies

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Asaf Tzachor*
Extreme Risks and the Global Environment
Centre for the Study of Existential Risk
University of Cambridge
at875@cam.ac.uk

Abstract

The question of how to sustain human development in the current ecological and institutional landscape is arguably one of the utmost scientific and administratively challenging contemporary dilemmas. In response to this issue, the concept of Sustainable Development was proposed by the United Nations to inform policies for societal and human development. However, for national governments, the prevalent sustainability schemes summon more confusion than coherence. This is due to the frequent and inconsistent ways the concept of sustainability is put into practice, and consequently, difficulties in measuring and managing sustainability. The ability to evaluate how sustainable public projects are, will remain deficient if sustainability remains a notion open for interpretation. This perspective article maintains that the capital theory approach to sustainability stands out as the most rigorous framework on the topic. The capital theory is a state-centric system of ideas where national governments oversee a portfolio of capital stocks of four families: natural capital, economic capital, human capital, and social capital. It is the duty of the government to act on the capital flow between different stocks to allow sustainable long-term development. This perspective paper underscores several envisaged gains from the application of the capital theory approach in public policy. Considering these expected gains, policy makers should be encouraged to experiment with the approach.

Global environmental change

Anthropogenic climate change brings disturbances to states and societies. With a persistent rise in the concentration of greenhouse gases in the atmosphere, the average global temperature has been increasing for over a century [1]. Consequently, oceans have acidified [2], ice sheets have melted [3], biodiversity has been jeopardized, and marine and terrestrial ecosystems have disintegrated [4, 5]. At some geographies, the frequency of droughts and dry spells has increased [6]. At others, the intensity of cyclonic storms is expected

*Opinions stressed in this article are solely of the author and do not represent those of the centre.

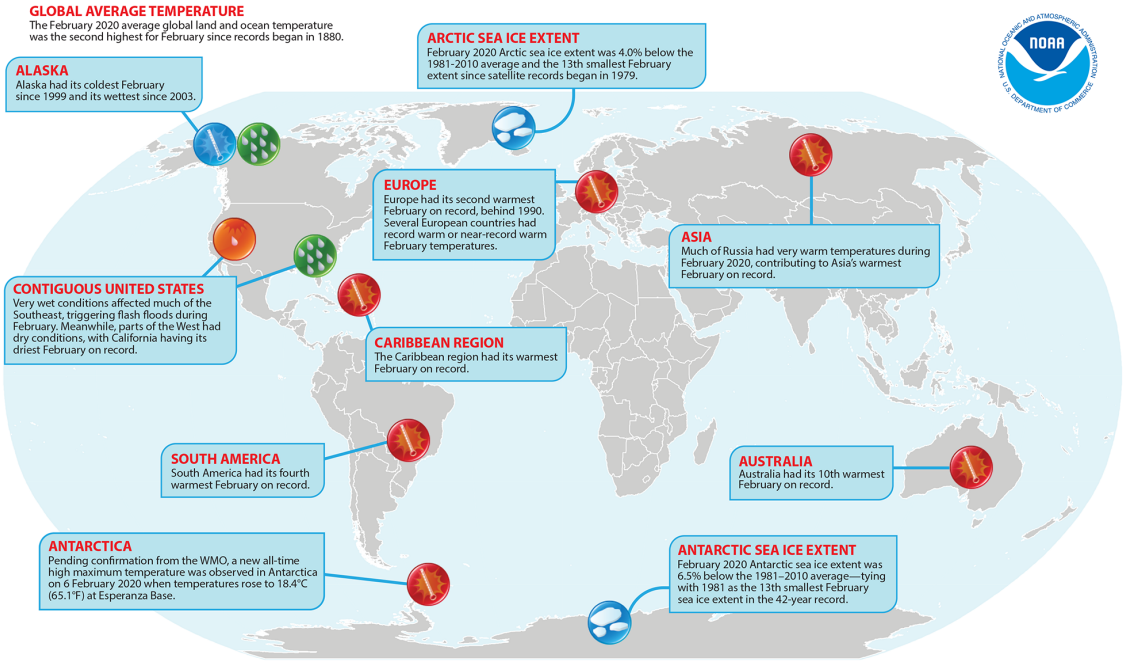

Figure 1: World map noting several significant weather climate events that occurred during February 2020. Figure adapted with permission from NOAA and the National Centers for Environmental Information [14].

to rise [7]. Globally, climate anomalies (see Figure 1) and climatic warming has inspired, and continues to inspire food insecurity, forced migration and conflict [8–13].

Alongside the transformation of the biosphere, the overexploitation of seas and top soils, fisheries and forests, of mineral deposits, and not least chemical contamination [15] have resulted in an array of human discomforts: diseases [16–18], displacements and disenfranchisements [19, 20].

For governments, global environmental change and the accelerated rate of alterations of ecosystems has created an ecological and institutional landscape that is much more challenging to maneuver through than ever before. The question of how to sustain human development in this landscape is arguably one of the utmost scientific, technological and administratively challenging contemporary dilemmas. The need to avoid social decline is a pressing concern facing twenty-first century governments in capital-constrained, competition-driven and fragmented and fragile environments.

Against this backdrop, scholarly and scientific schemes have evolved in recent decades to support better interventions in social affairs – at the global ranging down to local policy theaters – for societal and human development. One seminal proposal, the idea of Sustainability, or Sustainable Development, was introduced in 1987 by the Brundtland Commission to suggest that development ought to *'meet the needs of the present without compromising the ability of future generations to meet their own needs'* [21].

The 1987 sustainability project went on to inspire the United Nations Conference on Environment and Development, known as the Earth Summit, in 1992. The new interpretation of the notion by the Brundtland Commission also motivated 1) the institution of the Commission on Sustainable Development in 1992, 2) the Rio Declaration on Environment and Development– which listed 27 guiding principles for governments—in the same year, and 3) underpinned Agenda 21, an action plan for governments and regional organizations. Nonetheless, these schemes may have summoned more confusion than coherence and consistency for governments.

A fuzzy notion

Three years before the Brundtland Commission brought the concept of sustainability to the fore of international policy thinking, it was argued that sustainability had become an article of faith, frequently used, but little explained [22]. Too little has changed since. In 1991, it was claimed that sustainable development

> appears to have gained the broad-based support that earlier development concepts lacked [...] yet, the absence of a clear theoretical and analytical framework [...] makes it difficult to determine whether new policies will indeed foster an environmentally sound and socially meaningful form of development [...]. The absence of semantic and conceptual clarity is hampering a fruitful debate over what this form should actually be. [23]

Similarly, other critics maintained that the concept does not enjoy an accepted theoretical foundation [24], and that the idea of sustainability invited a theoretical 'maze of complexity' [25].

Cynics have highlighted the advantages attached to ambiguity:

> politicians have undoubtedly welcomed the opportunity to fasten onto a phrase that suggests radical reform without actually specifying what needs to change or requiring specific action [...] sustainable development has no coherent theoretical core. [25]

These criticisms have not subsided. More recently, it was proposed that sustainable development is not a scientific project, but a normative one (i.e. based on a belief of how things should be) [26], and that the concept remains open for interpretation [27]. In effect, researchers chose tautology over precision and measurability to define these concepts. For example, sustainability transitions theory, a branch of science and technology studies that has gained a foothold in various policy halls, defines a *sustainable* transition as a process through which '*a system shifts to more* sustainable *mode of production and consumption*' [28].

This theoretical weakness has not gone unnoticed in public policy institutions. In 2008, the United Nations Economic Commission for Europe (UNECE), the OECD and the European Union Eurostat asserted that sustainability alone, has no intrinsic value [29]. In 2014, the UNECE contended that a cloud of ambiguity hangs over the notion [30].

The policy consequences of scientific indistinctness

Six years in the wake of the Brundtland Commission, scholars began deliberating on the policy implications of an indistinct concept. One reproach was that sustainability covers development policies which vary from

> light-green to dark-green [...], from romantic and nostalgic conservatism to utopian socialism, from absolute-zero growth in the economy to maintaining the present world economic growth rate [31].

Indeed, from a public policy perspective, lack of clarity is obstructive [32–34]. The efficacy of allocating scarce resources to achieve a policy objective will be compromised if that policy objective is ill-defined. Furthermore, the ability of governments to evaluate the degree of sustainability of spending and investments, public projects, financial reforms, green deals or sectoral transformations will remain deficient if sustainability is not clearly measurable and cannot be deduced from empirical observations.

One more progeny of the international sustainability project—the Sustainable Development Goals, a framework of 17 goals, 169 targets and 232 indicators—was criticized for lacking a clear vision of what sustainable development really means [35–37]. In a similar fashion, it was proposed that sustainable development per se is unfit as a priority goal [38]. The International Council for Science pointed out the fact that the framework is under-informed by science [39]. The Council's ex-

perts survey showed that of the 169 targets, 54% (91 targets) could have been better specified, and 17% (29 targets) required significant elaboration. Furthermore, criticisms were related to the matter that goals and targets are often too theoretical and cannot be operationalized (i.e. put into practice), that indicators are of uneven quality, and that according to several nation states 17 goals, 169 targets and 232 indicators are cumbersome to implement and communicate to the public [40]. In view of these, and other caveats, it was argued the goals should merely be viewed as persuasive rhetoric [41]. The *Economist* labelled the goals '*worse than useless*' [42] and *Foreign Policy* considered them '*unactionable, unquantifiable, and unattainable*' for public policy [43].

Hinged on the indistinct concept of sustainability, the Sustainable Development Goals inevitably suffer the same shortcomings as previous proposals. To properly guide public policy, sustainability sciences should provide it with an alternative scheme, preferably pitched at the national level, where alternatives for the allocation of scarce resources are weighed and determined, and where accountability for development outcomes reside.

An alternative sustainability scheme for states

In the sustainability corpus, one interpretation of the idea stands out as the most rigorous, the most measurable, and the most applicable framework on the topic: the capital theory approach to sustainability [44]. Despite not receiving proper attention and being an often-neglected area of research, the capital theory has important implications for the contemporary sustainable development agenda. The theory is informed by both orthodox and heterodox approaches to economics including classical economics, natural resource economics and environmental economics [45–50], as well as by sociology [51–53] and environmental and sustainability sciences [54, 55].

The central premise of the capital theory system of ideas is that national governments steward a portfolio of capital stocks[2]. Each asset in the portfolio can be part of the state's natural, economic, human, or social capital. This approach makes capital theory state-centric. By the capital theory, maintaining human development over time entails the careful governance, use, measurement, conservation (if needed), and substitution (when necessary) of the critical assets which constitute the aforementioned four capital categories [29]. In order to understand capital theory, the following concepts should be defined.

Assets (or asset stocks) are the items which constitute each capital category. Natural capital, for instance, comprises mineral deposits, forests and fisheries.

Utilities are benefits that an asset yields to the state; as such they can be direct—that is, deriving immediately from the asset—or indirect, tangible (e.g. ore from a deposit) or intangible (e.g. trust).

Critical capital assets are assets that provide a stream of essential utilities for which no known substitute exists, for instance non-renewable phosphate reserves, public health apparatuses and trust, and so on.

Capital flow is a distinct process that causes the change of the value for a specific asset stock in time [29].

The good governance of asset stocks ensures the sustainability of nationwide progress: if stocks deplete or degrade, human development will eventually stop or reverse. The separation of capital stocks from capital flows, first suggested by Fisher [59], implies that governments administer capital assets through the regulation of flows (see Figure 2).

The capital theory underscores the important yet under-acknowledged duty of governments in managing the broad assets portfolio at their disposal (see Figure 3). Historically, this govern-

[2]The theory takes a broad and pluralistic interpretation of the concept of capital stock. Here, capital stock is defined as a set of physical or non-physical items–this could be a depository, a reservoir, a reserve, an accumulation, and so on–materials or information, that have built up over time. This interpretation is found in other strands of scholarship, for example system dynamics—a technique used to study the behavior of multipart systems using stocks, flows, feedback loops and time delays, which is frequently employed for policy analysis [56–58].

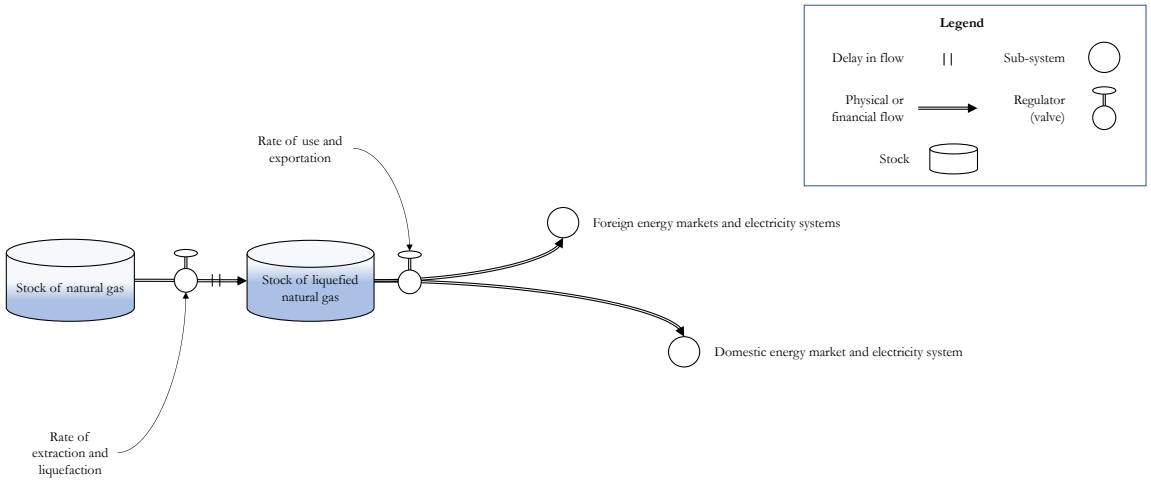

Figure 2: **A stock-and-flow model.** In the model, government institutions extract natural gas from a stock – a reservoir, or a natural storage place – liquify it to accumulate it in a stock of liquified natural gas, and set a rate of exportation and domestic use.

ment responsibility has been overshadowed by their emphasis on managing and measuring gross domestic product—which is just a flow variable. Prosperity, progress or human development, at any given time or over long periods of time, have never really been an explicit public policy priority. In former times, a focus on economic growth and other flow variables may have been justified. Human development could be assumed to increase more-or-less in step with gross domestic product. Considering the current extent of debts, inequalities, environmental pollution, deforestation, loss of biodiversity and climate change, this is no longer true [60].

Consistent with the capital theory, the United Nations, the European Commission, the International Monetary Fund, the Organization for Economic Co-operation and Development and the World Bank, interpreted sustainable development as

> development that ensures non-declining per capita national wealth by replacing or conserving the sources of that wealth; that is, stocks of produced, human, social and natural capital. [61] (paragraph 1.21)

More recently, the UNECE accepted the theory and maintained that sustainable development stresses the significance of protecting the national resource base and the capital stocks it encompasses [30]. Evidently, this operationalization of the sustainability notion is not foreign to public policy institutions.

Public policy gains

Policy gains from the application of the capital theory approach in public policy are an insufficiently discussed aspect of the approach and it is underutilized by governments. Delineating expected gains is therefore a modest contribution this paper aims to make to the philosophy and practice of sustainability. Deliberating on them may encourage policy makers to officially and explicitly experiment with the approach.

Firstly, the capital theory approach removes terminological ambiguity shrouding the concept of sustainability, which has been obstructive to sustainable development efforts. With a tangible, measurable and working conceptualization of sustainability, government interventions—public projects, financial reforms and green deals—can become easier to weigh and compare in terms of their multifaceted impacts on the societal broad base of resources.

Similarly, a system of national capital assets indicators should offer a space in which the sustainability of states and sectors, firms, factories, and farms can be assessed by measuring changes in val-

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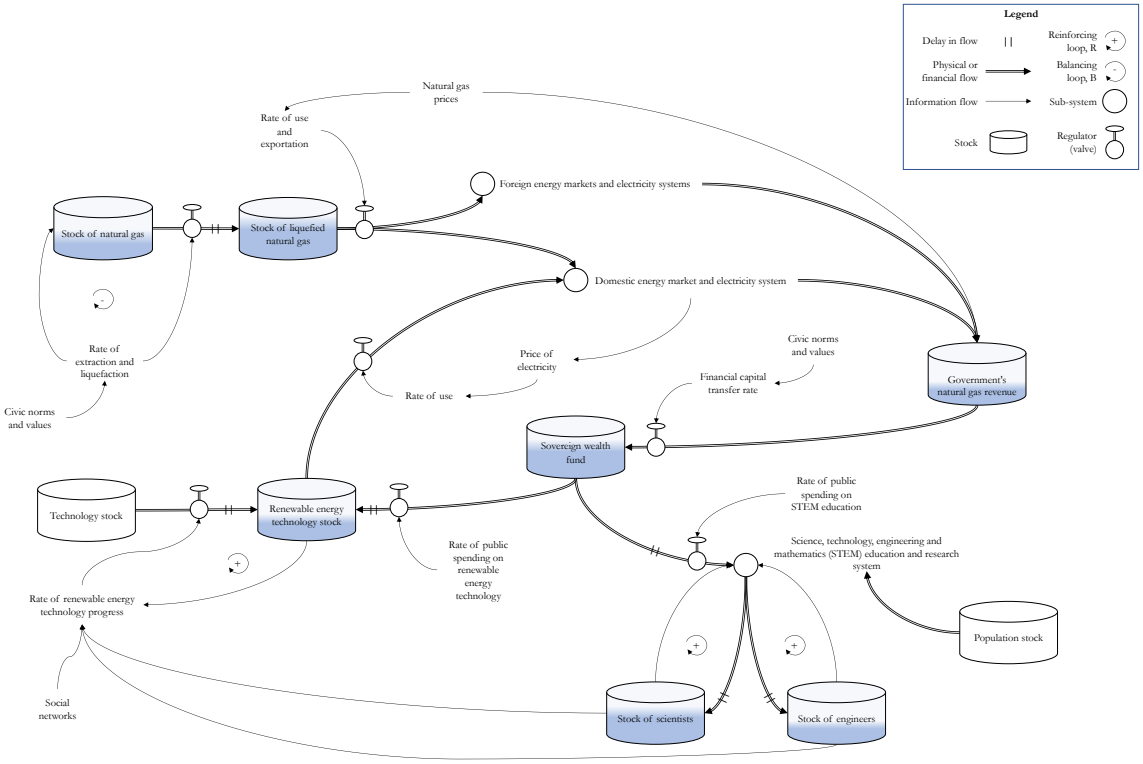

Figure 3: **Hypothetical schematization of the capital theory using a stock-and-flow casual loop model**. In the model, government institutions measure and manage (i.e. allocate and substitute) certain capital assets. In the model, natural gas (a depletable, tangible natural capital asset) is extracted from a reservoir, liquified, used domestically and exported. Civic norms and values (intangible social capital assets) inspire the government to create a state-owned sovereign wealth fund, where the government accumulates natural gas revenues (economic capital assets). In the long-term, returns to the fund's investments support science, technology, engineering and mathematics education (human capital assets). It also incentivizes renewable energy technology infrastructures (economic capital assets). The stocks of scientists and engineers increase over time, which accelerates the renewable energy technology progress. It is important to note that a final inventory of critical capital assets is context-dependent. Assets should be identified for each country separately. This schematization is a dynamic hypothesis for illustration purposes only.

ues and sizes at the capital stocks level overtime (see Figure 3). Such a system will assist governments to evaluate whether policies that aim to cater for the needs of the present generation draw too deeply on the resource base that will provide the needs of future generations. Moreover, analyzing first and second order effects of specific changes occurring in this space can guide more forward-looking institutional interventions.

As opposed to the system of 17 sustainable development goals, 169 targets and 232 indicators, a catalogue too comprehensive for the capacity of many government to measure and manage, a four-capital-stocks-and-critical-assets set of indicators promises a succinct yet rich enough tool for reflexive governance, easy to comprehend and disseminate—this is crucial to proceed to practical decisions [62].

Applying a capital theory approach within policy analysis and policy-making should help institutions focus on the factors –i.e. the stocks of capital – that allow economic production, social progress and human development to continue into the indefinite future, rather than merely on growth in the gross domestic product [63]. Alternatively put, and from the perspective of national

statistics, a system of capital stocks indicators should enable governments to move beyond conventional socio-economic measures towards measures of the factors that produce socio-economic progress.

This statistical and policy focus would challenge traditional near-term, present-biased thinking and policy-making. In addition, the integrated model will illustrate how institutional interventions in the administration of some socio-economic or environmental sub-systems have spilled over to interrelated sub-systems. It should indicate unsustainable development paths and will be capable of signaling ways in which regimes develop dependencies in depletable resources (see Figure 3). Moreover, the evidence-based framework should provide policy analysists and policy makers with an analytical device which connects sectoral-confined reforms and social-wide national consequences, assessing how each dominant sector (e.g. mining of rare metals) affects the sustainability of society at large.

By putting the framework to the task, turning the theoretical approach into a policy analysis and assessment framework, policy makers can benefit from a well-anchored theoretical perspective [64], which also operationalizes the concept of sustainable development, something which many projects and propositions in the sustainable development corpus do not do. In other words, a public policy approach based on the capital theory would allow policymakers to think more broadly about institutions, policy delivery systems, investment and consumption policies, national resources, and the state of capital stocks all at once.

Such framework will assist in focusing the attention onto the remaining capital assets and their interconnectedness [65]. It can help to investigate new capital stocks creation mechanisms and possibilities, and it underscores institutional intervention sweet spots. In the local context, it can give insight into how to rebuild capital of various sorts in different countries, where previous policies resulted in their depletion, for instance arable lands, soils, aquifers, and mineral resources.

Previous policy experiments with the capital theory, albeit implicit (i.e. before the approach reached theoretical maturity, and formalized as such), demonstrate that the conversion of capital assets from one form to another is a reoccurring exercise [66]. More important, particularly for governments, previous informal applications of the theory indicate that when capital assets are exploited and substituted is a proper manner, for instance by avoiding environmental contamination in extraction or by accumulating resource rents in sovereign wealth funds, human development outcomes can be maintained and enhanced over long periods of time [67, 68]. To this end, the case of Norway (i.e. the Government Pension Fund of Norway), and to a lesser extent that of Saudi Arabia (i.e. the Public Investment Fund), stand as such informal yet successful experiments with the theory [68–70] .

For risk management–such as planning, preparedness, prevention, reduction, response and recovery policies associated with risks–capital stocks should be considered as both buffers and strategic reserves [71]. In view of the COVID-19 pandemic, and the interdependency between systems' sustainability and systems' resilience [72–74], the emphasis the capital theory puts on stocks measurement and management, yields further benefits for public policy.

Finally, the capital theory allows a degree of flexibility and contextuality, which is helpful for the works of governments. It is through public agencies, state-owned and state-operated, that the sustainable administration of national resources can be achieved. Governments should start experimenting with it.

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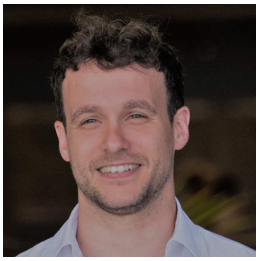
About the Author



Asaf leads the Food Security and Global Catastrophic Risks Project at CSER. The research explores dependencies and distortions in food systems and agricultural supply chains. It aims to better understand what shocks might threaten global food security, what the consequences of such disruptions may be, and how we can work to mitigate these risks. He completed his postdoctoral research in the University of Cambridge, his doctoral work in UCL Faculty of Engineering Sciences, STEaPP, and studied Environmental Sciences in the University of Oxford. He was a Research Scholar at Columbia University, and a Lord Weidenfeld Scholar in Balliol College, Oxford.

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